

## **Photoemission study of f-electron Heusler compound: UNiSn**

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Using photoemission spectroscopy (PES), the electronic structures of XNiSn (X=Ce, U) have been investigated. The f-electron Heusler compound UNiSn displays an interesting multiple phase transition around 43K, and CeNiSn belongs to the low carrier density f-electron system that opens a gap at low temperature. It is found that the valence-band PES spectra of UNiSn and CeNiSn reveal some common features which are related to the Ce/U *d*, Ni *d*, and Sn *sp* electronic character. The Ni 3*d* spectrum shows the main peak well below the Fermi level  $E_F$  and a very low DOS at  $E_F$  in both compounds. We have found that the high-resolution photoemission spectra of both UNiSn and CeNiSn are described well by the V-shaped metallic DOS near  $E_F$ , which implies the reduced DOS at  $E_F$  and the semi-metallic ground electronic states. Our study suggests that the effect of the hybridization matrix element between the *f* electron orbitals and the very low Ni 3*d* DOS at  $E_F$  is important in both UNiSn and CeNiSn. The comparison of the LSDA+*U* calculation to the measured PES spectra reveals the importance of the on-site Coulomb interaction between *f* electrons.